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2004

The Eighth International Symposium on Environmental Concerns in Rights-of-Way Management

**12–16 September 2004
Saratoga Springs, New York, USA**

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Monk Parakeets: An Expanding Problem on Power Lines and Other Electrical Utility Structures

J.R. Newman, C.M. Newman, J.R. Lindsay, B. Merchant,
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The monk parakeet (*Myiopsitta monachus*), a bird native to South America, was brought to the US in the late 1960s and early 1970s as a pet. They have escaped and now populations breed throughout the US from Florida to New York to Oregon to Texas. In urban and suburban areas in Florida and other states the monk parakeet nests on transmission lines, substations and distribution poles as well as other man-made structures and trees. As a stick building nester, its populations have grown exponentially in the last 10 to 15 years. Their nests on utility structures cause significant electrical reliability problems, increased operation and maintenance costs, and safety concerns. The monk parakeet is an invasive species that is banned in some states, e.g. California, but not in others, e.g. Florida. In the past, control of the monk parakeet involved shooting the birds. This was socially unacceptable and control measures stopped. Presently the most effective short-term control strategy is capture of the birds and removal of the nest. Nest removal without capture of the birds only compounds the problem, as the parakeets will rebuild their nests. Long-term controls for the monk parakeet are not yet developed, however, a chemosterilant, Diazacon, shows promise. This paper describes the effects of monk parakeets to electric utilities and other economic sectors, monk parakeet basic biology, and short-term and long-term control and management strategies.

Keywords: Monk parakeet, biology, nesting, electric reliability concerns, safety considerations, operation and maintenance costs, control and management strategies, ROW

INTRODUCTION

The monk parakeet (*Myiopsitta monachus*), a bird native to South America, was brought to the US in the late 1960s and early 1970s as a pet. It escaped and has become naturalized. Monk parakeets have spread and now populations breed throughout the United States. Their populations have grown exponentially. Monk parakeets have adapted to the urban and suburban environment and nest not only in trees but on man-made structures including electric utility structures. This

nesting is causing electrical reliability and safety problems. Presently there is no known effective way to control monk parakeets. This paper describes the effects of monk parakeets to electric utilities and short-term and long-term control and management strategies and is based on research studies conducted by Florida Power & Light Company (FPL) from 2001 to 2004.

BIOLOGY OF THE MONK PARAKEET

Basic biology

The monk parakeet is a medium sized parrot (11 to 13 inches or 28 to 33 cm) native to South America. It occurs naturally from central Bolivia and southern Brazil south to central Argentina. Adult males are slightly larger than females and both have identical in plumage. They are a grey/green bird with green

plumage on the back and tail, and grayish in coloration on the underside. The wings are dull green with the outer wing feathers blue. The tail is long and graduated and the bill is thick and yellowish brown with a brownish tip. Juveniles resemble adults with the exception that the feathers on the forehead of juveniles are darker (slate gray) than that of adults (gray-white) (Spreyer and Bucher, 1998). Monk parakeets feed on seeds and fruits. Analyses of food items from birds captured in South Florida indicate that at least 75% of the food items are seeds from bird feeders.

The species has been introduced and became established as a naturalized species to the mainland of the United States, Puerto Rico, Bahamas, West Indies, England, Belgium, Italy, Spain, and the Canary Islands. Monk parakeets have been introduced into at least 18 states: Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Massachusetts, Nebraska, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, and Washington, D.C./Virginia. The largest populations are in Florida, Illinois, New York, Rhode Island, and Texas (Spreyer and Bucher, 1998). The continuing presence of parakeets in the Northeast (e.g. New York City and New Haven) and the Midwest (e.g. Chicago) demonstrates their ability to survive cold, seemingly inhospitable winter conditions. In Chicago, parakeets in the winter fed almost exclusively on seeds from bird feeders (Hyman and Pruett-Jones, 1995). The ability of the monk parakeet to survive harsh winters is no doubt facilitated by food provided by people at bird feeders and other sites.

The species became established in the United States during the 1960s because of accidental or purposeful releases by individuals or pet shops. Thousands of monk parakeets were and have been imported for the pet trade. In the four-year period from 1968 to 1972, 64,225 monk parakeets were imported into the United States for the pet trade (Spreyer and Bucher, 1998). Because of the possibility that it would become an agricultural pest species, the Monk Parakeet was the focus of an eradication program by the United States Fish and Wildlife Service (USFWS) in the 1970s. This program reduced the numbers of monk parakeets at that time by approximately one-half (Neidermyer and Hickey, 1977). Since 1975, the year that the USFWS removal program ended, the numbers of Monk Parakeets have recovered and the species has exhibited a dramatic population expansion to levels far above the pre-control numbers in the early 1970s (Van Bael and Pruett-Jones, 1996; Pruett-Jones and Tarvin, 1998) (Fig. 1). Monk parakeets have exhibited a similar population expansion and increase in Europe, where it is also a naturalized species (Sol et al., 1997). In Florida, the largest numbers of parakeets are in the south and west coast of Florida where populations greatly expanded in the 1990's (Fig. 1).

Monk parakeets are the only species of parrot to build their own nest of sticks, they exhibit cooperative breeding, and are colonial breeders (more than one

pair may occupy a nest structure, up to 20 pairs have been observed in some nest structures) (Sol et al., 1997; Eberhard, 1998; Spreyer and Bucher, 1998). The nests can range in size from a couple feet in diameter up to ten or more feet in diameter. Monk parakeets build nests on tall structures including trees and man-made structures. Surveys in South Florida show that in some locations 80% of the nests occur on man-made structures (Table 1).

Monk parakeets have been observed nesting on crevices in buildings and window air conditioners in Brooklyn, New York. An examination of land use/land cover relationships in South Florida shows that monk parakeets, whether nesting on trees or man-made structures, nest primarily in residential areas (high and low) and appear to prefer these areas over areas dominated by natural vegetation and agriculture. Similar patterns are seen in New York, Connecticut, Illinois and Texas.

One misconception is that the monk parakeet is related to the Carolina parakeet (*Conuropsis carolinensis*), which became extinct in the US in the early 1920s. Monk parakeets are not closely related taxonomically nor do they fill the same niche as the Carolina parakeet. Carolina parakeets were wetland forest dwelling species that primarily build nests in trees.

Nesting characteristics on electric utility structures

From a utility perspective the population growth of monk parakeets on utility structures has two characteristics, an increase in the number of nests on a structure, and an expansion of nesting to different structures. In the South Florida study there was a 23% increase in nesting within substations with nests (351 to 430 nests) from 2001 to 2002 and a 13% increase in nesting on new substations (38 to 43 substations). For transmission lines, there was a 55% increase in nests on towers with nests (309 to 478) and 54% expansion of nests on new towers (218 to 335 towers).

The location of monk parakeet nests on distribution poles is quite predictable in South Florida. Eighty-two percent of the nests occurred on poles with transformers and capacitor banks. In particular, they appear to prefer building their nests on the brackets that attach the transformers and capacitor banks to the poles. In substations, 44% of the nesting occurred on 45° angle cross beams, followed by switches (18%) and vertical supports (18%). Other locations were also used including primary 90° supports, insulator/switches, and other substation support structures. Out of 54 towers surveyed, 96% of the nesting occurred on the secondary arms of the tower followed by the primary arms (69%). The one common situation in both substations and transmission lines is their apparent preference for 45° angles. On transmission towers, 93% of the nesting locations were in 45° angle braces. The cross arms ends with these angles were most frequently used (74%).

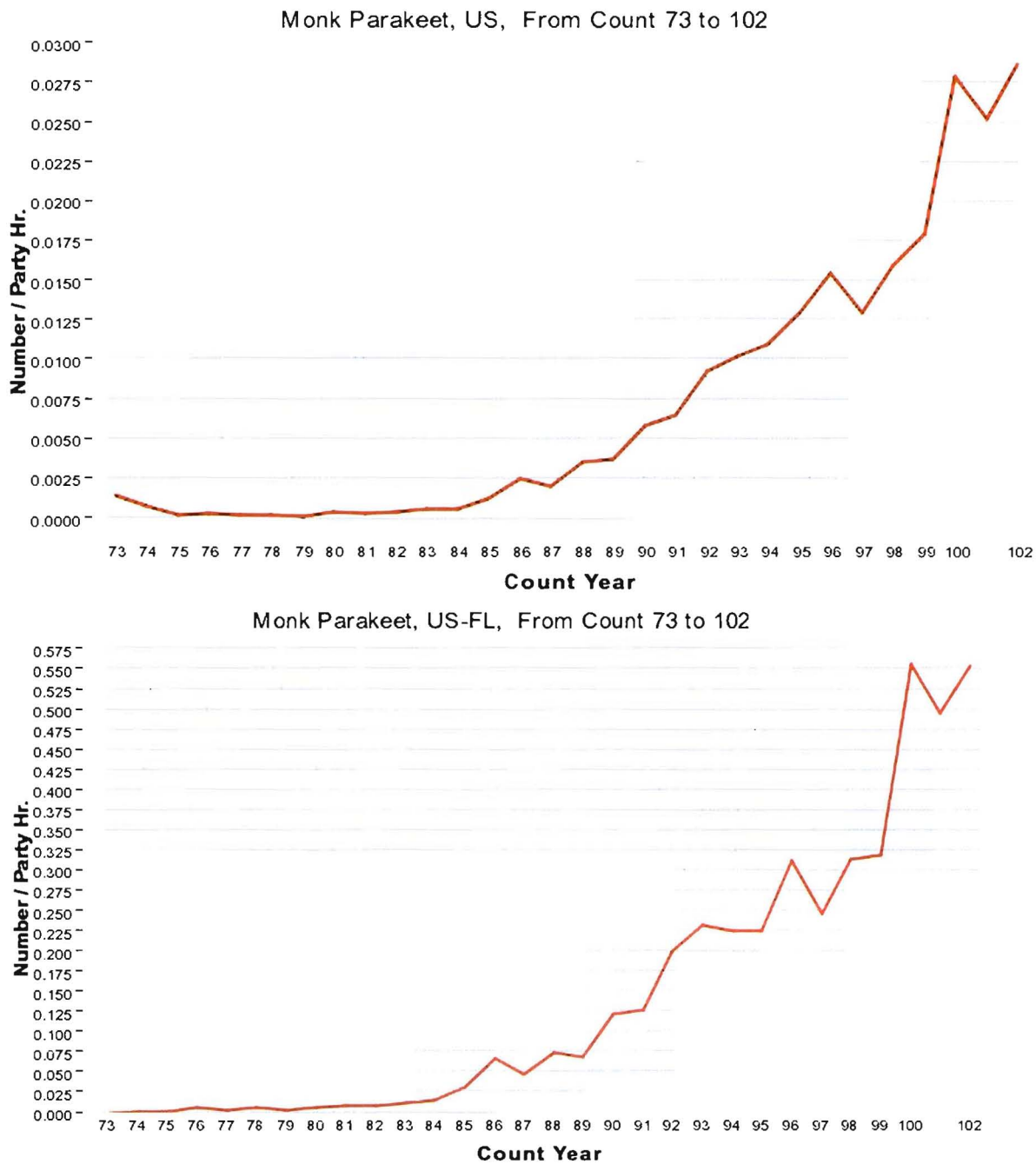


Fig. 1. Population growth of the monk parakeet from 1973 to 2002 (Count Year 73 to 102) in the US and Florida since 1973 (based on Christmas Bird Count Data).

Table 1. Nesting locations of monk parakeets in South Florida based on 60 transects

Distribution Poles	Substations	Transmission Lines	Stadium Lights	Satellite Towers	Radio Antennas	Light Poles	Trees
52% (81)	<1% (1)	7% (11)	9% (14)	1% (2)	3% (4)	8% (12)	20% (31)

EFFECTS OF MONK PARAKEETS

Monk parakeets cause significant problems to electric utilities and other sectors because of their feeding and nesting behaviors.

Effects to electric utilities

The major effect of monk parakeets to electric utilities is from their nest building behavior. Monk parakeets build a bulky nest structure of sticks and branches not only on trees but also in substations and on distribu-



Fig. 2. Nesting of monk parakeet on electric utility structures.

tion poles and transmission towers (Fig. 2). These nests can cause outages and fires.

The birds' tendency to use electric utility facilities occurs both in the parakeet's native range in South America (Bucher and Martin, 1987) and in the United States (e.g. Simpson and Ruiz, 1974; van Doorn, 1997). Monk parakeet nests can cause decrease in electric reliability, equipment damage, lost revenue from nest and bird caused power outages, increase in operation and maintenance costs associated with nest removal and repair of damaged structures, and public safety concerns. Monk nests attract predators (including humans) that also can cause outages. Problems with nesting on utility structures have been reported in Colorado, Connecticut, Florida, New York, New Jersey, Rhode Island and Texas. The problem of monk parakeets nesting on electric utility facilities in Florida dates back to at least to the late 1980's. Nesting activity has become an important service reliability issue more recently as the population has expanded (Avery et al., 2002).

Electrical reliability concerns

Effects to electrical reliability are the most significant problems with monk parakeets nesting on utility struc-

tures. For example, for a five-month period in 2001 a total of 198 outages related to monk parakeets were logged and affected over 10,000 customers in two counties in South Florida. The frequency of outages increases during wet weather. These outages result from nesting material completing an electric circuit between two energized parts or an energized part and a grounded part of electrical equipment. In some cases the nests get too large and complete an electric circuit. In other cases individual monks can bring nesting materials that can result in completing a circuit. Fires can start in the nesting material causing damage to transformers and other utility equipment.

Safety considerations

Safety concerns have included loss of power to critical care facilities, risk of injury to maintenance crews, and increased incentives to and risks of trespassing. In some service areas, e.g. New York City, distribution poles with lines connecting to residences have signs indicating that the resident is on some type of life support system requiring continuous power. Nests on these poles or nearby distribution feeders pose a significant risk to these residents. Crews taking down nests

are also at increased risk of injury. Although monk parakeets do not appear to be vectors for any human diseases the crews need to be protected from nest materials that contain mites and other insects that can cause itching and discomfort. Finally, because of the trade in monk parakeets in the pet industry, it is common for people to personally trap monk parakeets and to sell them to pet shops and other individuals. Wild caught monk parakeets can be sold to pet owners for as much as \$150 per bird. A number of electrocutions have occurred to individuals who have trespassed and climbed into substations to trap monk parakeets.

Operation and maintenance costs

There are several operation and maintenance costs associated with the effects of monk parakeets including direct costs such as:

1. Lost electric power sales revenue during outages.
2. Costs for restoration of power outages and repair of equipment damaged during outages.
3. Costs for removal of nests and other control and mitigation measures.
4. Indirect costs for utility management time and effort in attending to the problem.
5. Costs to electric customers for loss of service or reduced electrical system reliability.

These costs can be quite considerable. For example, for the five-month period in 2001 when 198 outages related to monk parakeets were logged, lost revenue from electric power sales was \$24,000. The cost for repair of outages was much more significant cost, estimated to be \$221,000 for 2001. The combined total estimated costs for 2001 associated with the outages were \$245,000 for only a portion of the FPL Service Area.

Effects to other industries

In South America, monk parakeets are reported to cause an estimated 2 to 45 percent loss on agricultural and orchard crops. In 2003 there was a report of monk parakeets causing significant damage to the tomato crop in Spain (BBC News, Thursday, 28 August, 2003, Quaker Parrots Invade Barcelona, by Danny Wood). In the 1970's the U.S. Department of Agriculture predicted that if monk parakeets became abundant in the US they would cause serious damage to agricultural and orchard crops. (Buhler et al., 2001). To date the monk parakeet has not spread in significant numbers to agricultural areas. No widespread commercial agriculture damage has been reported. Some damage to backyard homeowner fruit trees was reported. Connecticut has had sporadic reports of minor damage to backyard gardens and ornamental trees (Pearson and Olivieri, 1995). In South Florida, parakeets are known to feed on cultivated tropical fruits, such as longans (Tillman et al., 2001; Fig. 3). Based on the known feeding habits of monk parakeets in their native South American range (Spreyer and Bucher, 1998), many other crops in Florida such as sweet corn, rice,

and blueberries are potentially susceptible to damage by this species. In addition to eating fruit itself, parakeets also consume buds and flowers, which exacerbate their potential impact on crops.

There is also the possibility that parakeets will disseminate plant disease agents injurious to other crops in particular citrus crops. For example, in Florida citrus canker is a major concern. Monk parakeets build nests with sticks from various trees (Spreyer and Bucher, 1998). If parakeets happen to select an infected citrus tree for nest material, then the disease could be spread to uninfected areas, making control efforts more difficult. To date, serious agricultural damage has not materialized in Florida because monk parakeet populations are primarily found in urban and suburban areas; however, recent surveys of monk parakeets nesting on transmission lines in South Florida have found them extending their nesting into agricultural areas.

Where monk parakeet populations occur they are commonly found nesting on communication towers structures including cell towers, TV towers, and radar towers (Fig. 4). Although their nests can be quite large, their effects to communication are not known. The nests appear to be a nuisance with bird droppings or blocking access to upper reaches of towers. Presently they are seen as a maintenance problem. No effects to communication have been reported based on discussions with several communication tower owners who had nests on their towers.

CONTROL AND MANAGEMENT

Goals and objectives

The short-term and long-term goals for controlling and managing monk parakeet nesting are:

1. Reduce or eliminate electric reliability problems.
2. Reduce system operation and maintenance costs.
3. Reduce or eliminate public safety problems.

Since monk parakeet populations create reliability problems, increase costs and safety concerns, and are expanding exponentially in some locations, there is a need for both short-term and long-term control and management objectives. The short-term objectives are to remove high-risk nests and prevent nesting on structures. The long-term objectives are to reduce population size, reduce population growth, and enact legislation and policies to control monk parakeets.

Strategies

Strategies for achieving the short-term objectives need to be different for distribution poles, substations, and transmission lines because of structural differences of these systems and locational differences of the nests on the systems. Table 2 presents a summary of different short-term strategies that have been evaluated and tested by FPL.



Fig. 3. Monk parakeets feeding on Logan fruit in South Florida.



Fig. 4. Nesting of monk parakeets on communication equipment.

Table 2. Examples of various short-term strategies investigated for control and managing monk parakeet nesting on electric utility structures

General strategy	Specific strategy	Comments on effectiveness
Nest Removal with Captures of Birds	Manually take down the nest and capture of birds with net	Effective for distribution poles Is only effective if monk parakeets in the nests are also trapped, since renesting will occur Recolonization occurs but is the slowest if all birds are captured prior to taking down the nest Labor intensive and requires public education and cooperation Different trapping techniques needed for distribution poles versus substations Not practical for transmission towers
	Mechanically remove the nest	Nest can be removed by water canon or other device but not effective because of recolonization and public concern May be effective if repeated when new nests are started
Physical Deterrents	Structural modification of preferred nesting locations on structures, e.g. cover for transformer attachments	Different covers have been tried but the “seal” between pole and equipment needs to be very small so that nesting materials cannot be inserted
Behavioral Deterrents	Scare devices, e.g. laser	Temporary disruption of birds, but over a period of time (e.g. hours or days) birds return to previous nesting levels
	Effigies	No effect
	Electrical shock	Impractical because of engineering safety considerations
	Chemical Repellants, e.g. ReJex-iT	Not effective, temporary disruption, but birds adapt including building nests in different locations within a matter of days
Chemical Control	Various EPA-approved toxicants	Not feasible because of potential non-target species effects and public acceptance issues
Reproductive Control	Chemosterilants such as Diazacon	Potentially effective in reducing egg laying, field testing necessary. If proven effective public education necessary
ROW Management	Habitat Management	Not effective, monk parakeets appear to show nesting preferences based on surrounding land use not on ROW conditions

Only nest removal coupled with the capture of the birds shows promise in reducing high-risk nests and preventing renesting. Active trapping of monk parakeets with a net is required for distribution poles. Birds are first removed from the nests at night and then the nests are removed. If nests are removed without trapping the birds, the birds will renest. If the original nest was a colony of more than one pair it is very likely that each of these displaced pairs will build their own nests on the same or nearby structure. Passive trapping with a cage is somewhat effective for substations.

Long-term strategies include approaches to reduce the population size, to contain or reduce the nesting area, and reduce population growth so that the monk parakeet population diminishes over time. A

number of long-term strategies exist including identifying some type of natural biological control. One such potential natural biological control is the protozoan (*Sarcocystis falcatula*), considered harmful to other parakeet species but not to other species of birds. However, the monk parakeet was found resistant to *Sarcocystis falcatula*. Lethal control, such as shooting, was somewhat successful in the early 1970s but was not considered socially acceptable and was discontinued. Other lethal control alternatives include chemical control. For example, DRC-1339 (Starlicide®) is an EPA-approved toxicant used to control starlings and other problem bird species, but the efficacy on monk parakeets is not established. Pubic acceptance of such a control measure would be more difficult than other forms of control. Reproductive control is another long-term strategy whereby the population growth

on utility structures might be slowed. Primary information suggests that monk parakeet offspring may show a preference for nesting on the same substrate as their parents. If this is the case then selective reproductive control of these populations would be possible. Diazacon, a chemosterilant formerly registered as Ornitol® to prevent egg formation for pigeons, is a potentially useful reproductive control chemical. This approach, if found to be effective, would likely have broader public support than direct lethal control. Initial feeding trial with monk parakeets indicates that Diazacon may have similar effects on monk parakeets. Further feeding studies and field studies are warranted.

It is important to enact legislation and policies on the owning and selling of monk parakeet. Currently, no national policy exists for management or control of the monk parakeet. The original Lacey Act of 1900 attempted to control the importation of exotic species but included an exemption for monk parakeets. A number of states have legislation that prohibits the importation, transportation, or possession of monk parakeets. These states include California, Connecticut, Hawaii, Kansas, Kentucky, Pennsylvania, Rhode Island, Tennessee, and Wyoming where it is also illegal to own or sell monk parakeets. Florida has no restriction. It is important to point out that a number of these states have monk parakeets in spite of the laws, e.g. Connecticut and Rhode Island. Although the laws themselves will not assure that monk parakeets will not occur, they provide a governmental recognition of the invasive nature of monk parakeets and are more likely to provide electrical utility companies with government support for proposed control of the monk parakeet.

CONCLUSIONS AND RECOMMENDATIONS

Monk parakeets are an invasive species found throughout US. Their populations are expanding. Escaped pets have adapted to nesting on electric utility facilities and other man-made structures. Although the effects vary from place to place, monk parakeet nesting is a significant and growing problem for the electric utility industry. The nests of monk parakeets cause electrical reliability problems, increased operation and maintenance costs, and increased public safety considerations. Because of the differences in utility structures and differences in monk parakeet nesting patterns on the structure, different control strategies are required for different systems.

Management and control of the monk parakeet need to include the short-term objectives of removing high-risk nests and preventing nesting on structures. Long-term objectives need to include reducing population growth and population size, and enacting legislation

and policies to control monk parakeet. Currently, trapping birds combined with nest removal is the only viable short-term strategy for distribution poles and substations. This strategy is labor intensive and has public acceptance issues. Trapping and removal, if repeated, may be effective in a long-term strategy of reducing populations, but is labor intensive and needs to be repeated at least annually until the nesting stops. Presently, one potentially useful long-term strategy for reducing populations and population growth is a type of reproductive control. Continued research on this Diazacon is needed to make it practical and effective. Since monk parakeet nesting is an industry-wide problem cooperative research is needed.

A concerted effort is also needed by the utility industry to obtain invasive species policy support for the monk parakeet and enforcement where none exists. This effort needs to be coupled with education of public and natural resources agencies on the importance of the problem.

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BIOGRAPHICAL SKETCHES

The authors have been conducting research on the behavior, ecology, management and control of monk parakeets since 2000. Each of the authors has been evaluation bird interactions with power lines for more than 10 years. This research has been sponsored by Florida Power and Light Company.

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